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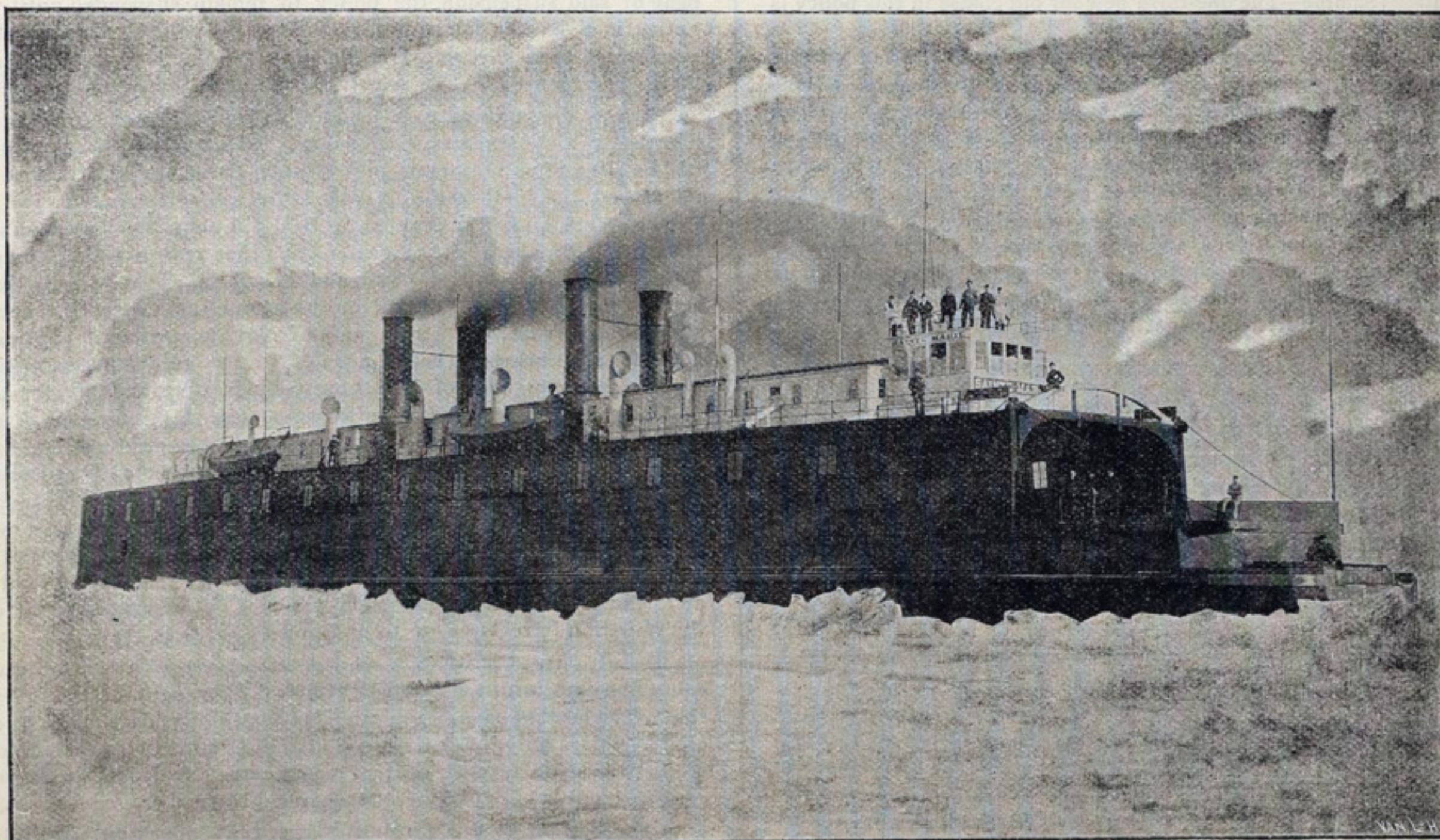
In the Ice at the Straits.

Probably no vessels in this country have attracted more attention than the transfer steamers of the Mackinac Transportation Company, which are engaged in carrying loaded cars across the Straits of Mackinaw. The peculiar service in which they are engaged, especially during the cold winter, is the main cause of interest in them, and the REVIEW is fortunate in having secured the striking picture that appears on this page, in which the Ste. Marie, built last winter by the Detroit Dry Dock Company, is shown with the surroundings which she was designed to meet. The vessel's freeboard with an ordinary load of eighteen freight cars on board is about nine feet, nearly all of which is seen to be needed on this trip, which was not, however, an unusually difficult one.

As soon after her appearance at the straits as the ice became heavy enough for trial, Capt. L. R. Boynton ran his boat out of the usual course until he found a smooth field of clear blue ice, which proved upon being measured to be 27 inches thick, and the Ste. Marie cut through this with-

break ice would be uselessly expended if the form of the hull permitted loose ice to cling to her and wedge around her as it does around an ordinary vessel. In fact, no amount of power that could possibly be applied would make a vessel of the usual freight type do her work. The upper deck of the hull proper is entirely given up to car accommodation, the cabins being carried on the hurricane deck, 25 feet or more above water. The sides are sheathed up, keeping the cars entirely under cover in transit, and incidentally relieving timid passengers of the fear caused by the sight of the seas in heavy weather. The usual appliances in the way of jacks and chains are used to steady the cars on the tracks. The length of the trip and the number of passengers carried calls for somewhat elaborate arrangement of passenger accommodation in way of dining saloon and ladies' and gentlemen's toilet rooms, which are arranged very conveniently and finely furnished.

The power is contained in four double-ended boilers, 11 feet 6 inches diameter and 17 feet 6 inches long, working at a pressure of 120 pounds per square inch, and two vertical inverted compound engines, of about



TRANSFER STEAMER STE. MARIE IN THE ICE AT THE STRAITS.

out any appreciable difficulty or inconvenience. To test her power of starting under such great disadvantage, she was stopped in this field, and started up again without any pretense of reversing the engines and backing clear, in the manner of ordinary vessels, to gain headway. Such a performance as this needs to be seen, Capt. Boynton says, to be appreciated.

The Mackinac Transportation Company is to be congratulated on the remarkable success of the vessel, which was designed by Mr. Frank Kirby of the Detroit Dry Dock Company, in anticipation of just such work. She is 269 feet 6 inches length of keel; 302 feet moulded length of deck; 51 feet 6 inches breadth, and 24 feet moulded depth. She has three tracks on the upper deck, sufficient for the accommodation at one time of eighteen cars of the ordinary freight type. The hull is of the strongest possible construction. It is the heaviest wooden hull on the great lakes, and is of oak for the most part, some long leafed Virginia pine being used for deck beams and track stringers. The frames are 12 inches thick by 24 inches deep on the keel, and there are fifteen keelsons, none less than 14 inches square. The planking is 6-inch oak and the vessel is sheathed with steel up to $\frac{1}{4}$ inch thickness, to prevent the ice from chafing the plank.

An important factor in the boat's success is her fine form under water, her coefficient of displacement being less than five-tenths. Her power to

2,500 indicated horse power for ordinary working. The bow engine has cylinders 28 and 52 inches diameter by 40 inches stroke, while the cylinders of the after engine are 32 and 58 inches diameter by 48 inches stroke. The air pumps are of the Worthington independent duplex type, the size of the forward one being 12 and 15 inches by 15 inches, and the after one 14 and 19 by 15 inches. The feed pumps are also independent of the main engines, leaving only the bilge and cooler pumps to be worked at the expense of propelling power. The auxiliary machinery comprises also an electric light engine, for a plant of 300 lights and a search light, four steam gipseys for handling lines, and an engine for hoisting the gate at the bow under which cars must run in loading and unloading. Among her special fittings may be noted four hydraulic ash ejectors, of the type for which the Dry Dock Company is becoming noted, and by the use of which the labor of getting the ashes overboard is reduced to shoveling them into the hopper in the fire-room. The fireman opens the valve, shovels in the ashes, and the machine does the rest.

The Ste. Marie is fitted with two anti-rolling tanks between decks, similar to those on the St. Ignace, which reduce the rolling of the vessel in a remarkable degree, but independent of these she is claimed to be a steady vessel, and one of which Capt. Boynton and his crew are justly proud.

Insurance Tariffs for Wood and Iron Hulls.

Following is the insurance tariff in full on wooden hulls for 1894, adopted by lake underwriters at the meeting in Cleveland last week:

SEASON RATES.

| VALUATION IN POLICY. | \$150,000 and over. | 100,000 and under 150,000. | 75,000 and under 100,000. | 50,000 and under 75,000. | 25,000 and under 50,000. | 15,000 and under 25,000. | 10,000 and under 15,000. | Under 10,000. | Particular Average. |
|--|---------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|---|
| LIMIT OF INSURANCE. | $\frac{9}{10}$ | $\frac{9}{10}$ | $\frac{8}{9}$ | $\frac{7}{8}$ | $\frac{6}{7}$ | $\frac{5}{6}$ | $\frac{4}{5}$ | $\frac{3}{4}$ | |
| Steamers.....A1 Season April 1 to Dec. 5. | $\frac{23}{4}$ | 3 | $3\frac{1}{4}$ | $3\frac{3}{4}$ | $4\frac{1}{2}$ | $5\frac{1}{2}$ | $6\frac{1}{2}$ | 8 | Same as full season rate for full policy. |

IN CASE OF A1 STEAMERS, VALUED AT \$50,000 AND UPWARDS.

Deductions.—Deduct for excepted fire risk, pro rata of, 1 per cent; for total loss and general average only, 10 per cent.; for total loss (actual and constructive only, 30 per cent.; deductions for total loss and general average or total loss to be made after deduction for fire risk, if excepted.

Additions.—For four-fourths collision clause, without average, add 75 cents; for waiving one-third new for old clause, as per sample endorsement, waiving uninsured interest and making settlement of loss by fire as per conditions of ordinary fire insurance, and including winter risk, add 75 cents. (Sample—The one-third new for old clause in this policy is waived except on canvas, rope and hawsers.)

In case owners of A1 wood steamers valued at \$50,000 and upward do not wish to avail themselves of all the concessions above noted, the following separate charges may be made: Waiving one-third clause and making settlement of loss by fire as per conditions of ordinary fire insurance, 50 cents; waiving uninsured interest, 25 cents; for winter risk, 25 cents; for waiving particular average under — per cent., unless caused by stranding, sinking, burning or collision, 50 cents. It must be understood that the foregoing concessions and charges apply to only A1 wooden steamers, valued at \$50,000 and upward. In case any of these concessions are taken by the assured on other than a yearly policy, they are subject to deductions for time expired and cancellations as noted below.

IN CASES OF A1 STEAMERS, VALUED BELOW \$50,000.

Deductions.—The same as on A1 steamers valued at \$50,000, and over.

Additions.—Add for four-fourth collision clause, without average, 75 cents; for three-fourth collision clause, with \$2,500 average, 50 cents; for yearly policy, 25 cents; for waiving one-third new for old, 20 cents; for agreement to make loss or damage by fire to be settled on the conditions of special clause, for the season, 50 cents; With deductions for time expired and cancellations as noted below, or for year, 75 cents. This fire clause to be attached to such marine policies only as include fire risk.

SEASON RATES.

| VALUATION IN POLICY. | \$150,000 and over. | 100,000 and under 150,000. | 75,000 and under 100,000. | 50,000 and under 75,000. | 25,000 and under 50,000. | 15,000 and under 25,000. | 10,000 and under 15,000. | Under 10,000. | Particular average same as full season rate for full policy. |
|---------------------------------------|---------------------|----------------------------|---------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|--|
| LIMIT OF INSURANCE. | $\frac{9}{10}$ | $\frac{8}{9}$ | $\frac{7}{8}$ | $\frac{6}{7}$ | $\frac{5}{6}$ | $\frac{4}{5}$ | $\frac{3}{4}$ | | |
| Steamers.....A1 $\frac{1}{2}$ | $3\frac{3}{4}$ | 4 | $4\frac{1}{2}$ | 5 | 6 | 7 | 9 | | |
| Sail.....A1 | $4\frac{1}{4}$ | $4\frac{3}{4}$ | $5\frac{1}{4}$ | $5\frac{1}{2}$ | 6 | 7 | $8\frac{1}{2}$ | | |
| Season April 1 to Nov. 30. | $4\frac{1}{2}$ | 5 | $5\frac{1}{2}$ | $6\frac{1}{2}$ | 7 | $7\frac{1}{2}$ | 9 | | |
| LIMIT ON INSURANCE. EXCEPT B1. | | $\frac{8}{9}$ | $\frac{7}{8}$ | $\frac{6}{7}$ | $\frac{5}{6}$ | $\frac{4}{5}$ | $\frac{3}{4}$ | | |
| Steamers.....A2 | | $4\frac{3}{4}$ | $5\frac{1}{4}$ | $5\frac{3}{4}$ | $6\frac{1}{2}$ | $7\frac{1}{4}$ | $9\frac{3}{4}$ | | |
| Limit $\frac{2}{3}$ on B1 | | | | 8 | 9 | $10\frac{1}{2}$ | 13 | | |
| Season April 1 to Nov. 30. | | | | | | | | | |
| Sail.....A2 | | | 6 | 7 | 8 | 9 | 11 | | |
| Limit $\frac{2}{3}$ on B1 | | | | 8 | 9 | 10 | 12 | | |
| Season April 1 to Nov. 10. | | | | 9 | 11 | 12 | 14 | | |
| | | | | | | | 5,000 and under 10,000 | Under 5,000 | |
| Lake Tugs.....A1 and A1 $\frac{1}{2}$ | | | | $3\frac{1}{2}$ | 4 | $4\frac{1}{2}$ | $5\frac{1}{4}$ | 7 | 5 |
| A2 | | | | 4 | $4\frac{1}{2}$ | $5\frac{1}{4}$ | $6\frac{1}{4}$ | $7\frac{1}{2}$ | 6 |
| A1 $\frac{1}{2}$ | | | | | | 6 | 7 | $8\frac{1}{4}$ | 8 |
| B1 | | | | | | $6\frac{1}{4}$ | $7\frac{1}{4}$ | 9 | 9 |
| Season April 1 to Dec. 10. | | | | | | | | | |

IN CASES OF A 1 $\frac{1}{2}$ STEAMERS AND BELOW, AND SAIL VESSELS AND TUGS.

Deductions.—Deduct for total loss and general average only, steam, 10 per cent; sail, 20 per cent.; (actual and constructive only), 30 per cent.; excepted fire risk on steam craft, pro rata of, 1 per cent. Deductions for total loss and general average, or total loss, to be made after deducting for fire risk if excepted. Deduct for harbor tugs with lake privilege to the extent of 20 miles, 1 per cent.

Additions.—Add for wrecking privileges on tugs, 1 per cent. Where full wrecking privileges are not desired policies may be endorsed "Permission to wreck for $\frac{1}{4}$ per cent. additional for each service rendered to Oct. 1st and thereafter at $\frac{1}{2}$ per cent. for each service rendered." Add for four-fourths collision clause without average, \$1.00; three-fourths collision clause with \$2,500 average, 75 cents; agreement to make loss or damage by fire to be settled on conditions of special clause for season, 50 cents; with deductions for time expired and cancellations as noted below, or for the year, 75 cents; this clause to be attached to such marine policies only as include fire risk.

For fire policies only on steamers.—A 1 and A 1 $\frac{1}{2}$, 1 per cent. per annum, with 80 per cent. clause; A 2 and A 2 $\frac{1}{2}$, 1 $\frac{1}{2}$ per cent. per annum, with 80 per cent. clause; B 1, 2 per cent. per annum, with 80 per cent. clause. Tugs—Coal burners only, 1 $\frac{1}{2}$ per cent. per annum, with 80 per cent. clause. The 80 per cent. clause is obligatory in all cases.

Suspensions, for all classes and values.—An allowance may be made of 6 per cent. of the ex-fire season rate for each thirty consecutive days when a vessel is laid up in port during the life of this policy, but it is obligatory on the part of the assured to give written notice to the company of said suspension, the policy to remain suspended until written notice is given the company to reinstate the policy. This rebate, however, is not to be allowed while the vessel is subject to or undergoing repairs, the expense of which is participated in by the insurance companies.

Rules.—No allowance or deduction shall be made for portions of months expired except as noted below, No more than six months credit will be allowed on premiums, and all notes to mature on or before Nov. 1 on season risks; discount for cash at the rate of 6 per cent. per annum. Free extension may be granted to Dec. 5 at noon to all steamers which class A 1 $\frac{1}{2}$. A charge for extensions on other vessels will be made as follows: Steam vessels 2 per cent., and on sail vessels and tow barges 4 per cent. of the season rate per day on the form of policy issued, such extensions to be for five days from noon of Nov. 30, provided application be made for such extension before noon of Nov. 30. A further extension may be granted from noon of Dec. 5 on steamers only, and only for the purpose of completing an unfinished voyage. The charge for such extensions shall be 2 $\frac{1}{2}$ per cent. on A 1 and A 1 $\frac{1}{2}$, and 5 per cent. on A 2 of the full season rate per day, on form of policy originally issued. The classification of Inland Lloyds Register for 1894 to govern as to class and value of all vessels. On A 1 and A 1 $\frac{1}{2}$ steamers and A 1 sail the value in policy not to be less than 80 per cent. of the valuation in the register, and not to exceed register valuation. On A 2 steam craft and below, and A 1 $\frac{1}{2}$ sail barges and below, and all tugs, the value in policy not to exceed 90 per cent. of the valuation in register nor to be below 80 per cent.

Deductions.—Up to Sept. 1 a deduction to be allowed for each and every five days until the policy attaches of 1 per cent. of the full season rate. The last six days of any calendar month of 31 days shall be considered five days only. For risks not attaching until Oct. 1, 40 per cent. of season rate; Nov. 1, 55 per cent. of season rate. No deduction for partially expired months of September, October and November.

Cancellations.—June 1, return 70 per cent. of season rate; July 1, return 60 per cent.; August 1, return 50 per cent.; Sept. 1, return 40 per cent.; Oct. 1, return 30 per cent.; Nov. 1, return 20 per cent.; Nov. 15, return 10 per cent. No allowance for partially expired months except for the month of November as noted.

Trip risks.—In case owners do not desire for first trip to take out season policy, but wish insurance for that trip, the rate of premium to be charged is 10 per cent. of the full season rate of the particular form of insurance desired, payable in cash; policy to attach on actual sailing of the vessel from port of loading, and to terminate forty-eight hours after arrival at port of discharge.

No general agent or company will allow over 10 per cent. commissions to local agents on wooden hulls and 5 per cent. on metal hulls, or any other consideration whatever, at any time whatsoever, and no agent, company or general agent shall be allowed to pay any part of the commission to any vessel owner, broker or any other person.

LAKE HULL TARIFF ON METAL AND COMPOSITE BOATS, SEASON RATES, '94.

Steamers.—A1, double bottom metal and composite steamers, valued at \$75,000 and upward, as per conditions of form attached, 3 per cent.; A1, double bottom metal and composite steamers, valued at \$50, to \$75,000, as per conditions of form attached, 3 $\frac{1}{4}$ per cent.; deduct from double bottom metal steamers, having bottom sheathed with wood not less than four inches thick, 25 cents; add for single bottom metal steamers, 25 cents. No

additional charge for single bottom metal steamers sheathed with wood not less than four inches thick, as per conditions of form attached.

Metal barges (meaning whalebacks)—Metal barges, conditions as per form attached, $3\frac{3}{4}$ per cent.; if ex-collision, deduct 50 cents.

Form above referred to—This insurance is against total loss, general average, and all other damage and loss, but warranted free from particular average under 3 per cent. unless caused by stranding, sinking, burning or collision; collision to be interpreted to extend to damage resulting from contact with docks, rocks, piers or rafts; all loss or damage by fire to be paid in full and in accordance with the customs and usages of fire insurance policy, without regard to the valuation of the vessel as expressed in this policy. No one-third off new for old. The season of navigation under this policy is from noon of April 1 to noon of Dec. 5, ensuing; between noon of Dec. 5 and April 1, ensuing, said vessel shall be laid up and properly moored, satisfactory to this company. Should the vessel remain in port thirty consecutive days during the season of navigation, a rebate of 20 cents per one hundred dollars will be allowed to assured; no rebate for April, 1894. In the event of the vessel, from any cause whatever, being at sea later than noon of the 5th of December, it is hereby agreed to hold the assured covered against such additional risk up to noon of the 10th day of December (Chicago time), in consideration of a pro rata additional premium; notification of such extension being given to assurer prior to noon of the 5th of December. This insurance also specially to cover loss of, or damage to, hull or machinery through the negligence of master mariners, engineers or pilots, or through explosions, bursting of boilers, breakage of shafts, or through any latent defect in the machinery or hull, provided such loss or damage has not resulted from want of due diligence by the owners of the ship, or any of them, or by the manager, subject to the average conditions above set forth.

Collision clause—It is agreed that if the vessel hereby insured shall actually herself come into collision with any other vessel, and the assured shall in consequence thereof become legally liable to pay, and shall pay any sum or sums for damages, to said other vessel, her freight or her cargo, in such case this company will contribute toward the payment of the total amount of said damages in the proportion that the sum insured under this policy bears to the valuation of the vessel as stated therein. Provided always that the whole amount of such damages, for the purpose of settlement under this policy, shall in no case be taken to exceed the valuation as fixed herein. It is also agreed that this company will bear a like proportionate share of any damage done by collision of the ship insured with docks, piers, wharfs and rafts. And it is also agreed that this company will bear a like proportionate share of any costs and expenses that may be incurred in contesting the liability resulting from said collision, provided the written consent of this company to such contest be first obtained. But under no circumstances shall this company be held liable for any contribution in respect of any sum that the assured may be held liable to pay by reason of loss of life or personal injury, or for damage to or loss of personal effects of individuals from any cause whatever.

Classification in the U. S. Standard Register.

In a supplement accompanying this issue sectional and side elevation plans of a wooden steam vessel, to class A 100 in the United States Standard Register of Shipping, are presented. The largest of the steamers now nearing completion at the yard of Capt. James Davidson, West Bay City, Mich., is building from these plans and is a very notable vessel, well worthy of more extended attention than she has received. Although steel has almost supplanted wood as a shipbuilding material, there is still a vast quantity of the finest ship timber easily available to the lake builders, and which will undoubtedly be worked up, so that it is quite in order to give some attention to this interest, and to the advantages of classification for wood as well as steel boats. The Davidson steamer referred to will have 1-inch double steel keelsons, steel arches and chords, will be diagonally strapped, and will also have steel inside arches, as shown on the plans. As regards strength of construction, this steamer will have no superior among wooden vessels on the lakes, and in power (she is to have large triple expansion engines) and equipment she will compare favorably with the largest steel vessels.

More than fifty of the finest steel vessels on the lakes have been classed by the society publishing the United States Standard Register of New York, and nearly all of the largest vessels now under way in lake yards are being built under inspection by the same society, so that the movement to class wooden vessels is worthy of attention from both owners and builders whose interests are still in that line. Of course, the advantages claimed for classification of this kind have been quite generally discussed. The inducement held out by the publishers of the Standard Register is that with the best class of wooden vessels, as well as the steel ships, the classification has a standing with American and foreign underwriters that entitles vessels to the lowest rates of insurance and affords valuable information to underwriters and shippers, thereby resulting in value to ship owners. The drawings are from the latest supplement to the register.

British charts of Lake Superior cover the entire north shore. \$1.

The Underwriters.

Some negotiations for cargo insurance business have been going on since the tariffs were announced a few days ago, and a few hull risks have, of course, been covered also, where insurance was wanted. There has as yet been no talk of any cutting of rates, and it is probable that the early loss of the steamers Barnum and Minneapolis in the Straits, together with other minor accidents, will tend to prevent deviation from the tariffs. It is plain since the publication of the tariffs that in numerous changes, which do not appear important when not taken collectively, the underwriters have again arranged matters largely to their advantage. As far as can be learned, the committee having in charge the appointment of an adjuster to pass upon adjustments for all companies has not as yet taken any action. At least, Capt. A. R. Manning of Cleveland has not been appointed to the position. The general agents claim that their principals have demanded the appointment of such an officer, as they declare that some companies have paid claims which they knew to be excessive, but could not object, on account of the fear of a loss of business through refusal to pay.

Around the Lakes.

Collector of Customs Zehring of Cleveland has appointed William W. Grant deputy collector at Conneaut.

Thomson & Lynn are to build another wooden tug at Port Huron. She will be 95 feet long and will have engines 17 and 30 by 36 inches.

Capt. George McCullaugh has purchased an interest in the steam barge which is being built at Gibraltar, Mich., and will be her sailing master.

Capt. William J. Waters died in Oswego March 30, aged sixty-two years. Among vessels which he commanded on the lakes were the schooners Alice, Star of Hope, Santiago and Scotia.

H. R. Spencer, admiralty lawyer at Duluth, has been appointed lecturer on admiralty law at the law school of the Minnesota state university. Mr. Spencer will devote only a portion of his time to the new duties.

One of the Grummond tugs, the Crusader, is at Mackinaw in readiness for wrecking work. She will be relieved shortly by the Champion, which is undergoing a general overhauling in preparation for regular service at the straits.

As a result of a request recently made by the Shipmasters' Association, the Whitefish point light, Lake Superior, will shortly be changed from a third order light to a light of the second order, the same as the light on Spectacle reef.

The new steel steamer to be built by the Cleveland Ship Building Company for the Minch line will be named I. W. Nicholas, in honor of the retired ship builder and vessel owner of that name who has been associated with the Minch family in the ownership of vessel property.

C. F. Palmer of Palmer & Co., Cleveland, will, in a few weeks, be permanently located in Chicago. He goes to join Messrs. Cook and Calbick in a new firm of vessel agents, to be known as Palmer, Cook & Calbick. He will retain his interest in the Cleveland firm, in which there will be no change of name.

Pleasure is the name selected for the wooden ferry steamer being built by F. W. Wheeler & Co. of West Bay City for the Detroit, Belle Isle and Windsor Ferry Company. The boat will be out about June 1, and with three decks will have a capacity of 3,000 passengers. Capt. George Shanks will command her and Nicholas Huff will be chief engineer.

Capt. Henry Bundy of the gospel ship Glad Tidings says he will spend the greater part of the coming summer with his vessel on the north shore of Lake Superior. He is trying to secure a steam launch, so as to work into small ports where the draft of water is not sufficient for his vessel. His work, alike to that of other missionaries, is undoubtedly of some good and he is deserving of support.

Chauncey Richardson of Ashtabula is the newly appointed deputy collector at Ashtabula Harbor. He is well known on the chain of lakes and will make a good officer. He has located his office over P. H. Cheney's store. The office is being refitted and will make pleasant quarters for marine men that go to the harbor. Mr. Richardson is a brother of W. C. Richardson of the firm of H. J. Webb & Co., Cleveland.

One of the neatest specimens of printing in an advertising way, that we have seen for some time, is a little volume entitled "Facts and Advantages," gotten out by Stanley B. Smith & Co., Detroit river fuel dealers. It is a collection of bright sayings and tasty engravings intermingled with a calender, in the make-up of which a page is given to each month. Captains will be supplied by applying to the superintendent of the docks.

Lake Superior boats to run in connection with the Vermont Central Railway will be operated by a new company to be known as the Duluth and Ogdensburg Transit Company. According to report, some of the Ogdensburg boats that have been running to Chicago will go to Lake Superior with the steamers Ohio, Ford and Saginaw Valley, while the Pueblo, Denver and John Rugee have been chartered for the Chicago-Ogdensburg service.

Some Points on Lake Charts.

Editors MARINE REVIEW:—I have only recently read Commander Brice's excellent article in your issue of March 8, entitled "Some Points on Lake Navigation" and agree with all of his statements except some of the remarks concerning the making of new charts for the lakes. Commander Brice says:

"A new survey and new charts, including harbor charts, are absolutely necessary for safer navigation of the lakes; also complete descriptive sailing directions. The present chart of Lake Michigan was an excellent one for its day and time and was constructed under many difficulties compared with the appliances of today. Two surveying vessels would find plenty of occupation on Lake Michigan alone for some years to come. The coast survey is well equipped with vessels and appliances for the work, and a corps of skilled officers is available for the purpose. The same applies to the hydrographic office. To the ship owners on the lakes it makes no difference who does the work, so long as they are provided with charts as correct as those of other waters of the United States."

As to the necessity for the re-examination of many localities I think everyone is agreed. I do not think, however, that the vessel owners do not care who does this work. It seems to me that it is of great importance to vessel owners and navigators that the most recent and accurate information should be furnished them concerning the lakes, and in addition that the most that is possible shall be done with any money that may be appropriated by congress for this purpose. The organization that can give the vessel interests the most results for the least money is beyond all question the one that has charge of the improvement of rivers and harbors throughout the lake region.

This organization has upon its files the most recent surveys of every harbor of importance on the lakes—and in addition at two or more points in each of the organized river and harbor districts are offices at which are skilled surveyors and all the instruments and appliances for the most accurate survey work, this surveying equipment being essential for the proper prosecution of the improvement of the various rivers and harbors. All vessel owners are familiar with this organization, but Commander Brice makes no mention of it in his article. It is hardly possible that he can be unaware of its existence. Such general survey work as is possible under the present small appropriation is now being done by this organization, a resurvey of St. Mary's river is also in progress, and new charts are in course of preparation. Commander Brice praises the old survey upon which the present charts are based; an excellent survey, as he says, for its day and time, and yet he says not a word concerning the organization that made it.

When the old lake survey organization was disbanded the charts of the lakes were at that time well suited to the needs of navigators. Since then has come the enormous increase in lake commerce together with the use of larger and deeper draft vessels. In addition changes have been going on in the lake bottom until today the necessity for re-examination of many localities is apparent. A complete new survey of the lakes is not needed, but money is wanted to keep all of the existing charts up to date, and to issue new charts of special localities when a demand for them arises. This cannot be done without a special appropriation for the purpose, as the river and harbor appropriations, as a rule, are confined to definite localities, and cannot be used for general work throughout the lakes. At the same time the appliances and men engaged in river and harbor work can be transferred temporarily to work of this kind with a great saving in time and money.

Let us see how such an arrangement works. Information having been received of a hitherto unknown shoal, say in Lake Michigan, an order to survey it is sent to the nearest river and harbor office. The necessary party and appliances are gotten together at once, go to the shoal, survey it, plot their new soundings on one of the published charts, and send it to Washington so that all charts afterwards published may show the new shoal. Meanwhile, the party engaged in this work has been transferred to its regular duties and only what money has been absolutely necessary for the survey has been expended. Thus fifteen or twenty parties could be out at the same time in different parts of the lakes when necessary, and only one or two parties need be out when work of this kind was slack. In this way the services of trained men could be obtained whenever required without having to keep up an independent expensive organization, which might be idle for long periods at a time.

But there is a great deal of information that is available for issue to navigators at once, were the money available to permit its publication. I refer especially to harbors, concerning the necessity for new charts of which, Commander Brice speaks. In the office of the chief of engineers at Washington are manuscript charts of every important harbor on the lakes; these are plotted from the surveys that are always made before and after the execution of every contract for improvement; these surveys are made with extreme accuracy as payments to contractors for excavation, etc., must be made from them; far greater accuracy must be used than would be the case were the surveys made solely for the purpose of navigation. In most cases the most accurate and economical method of sounding known

is resorted to—that of sounding through the ice with poles. Of all hydrographic surveys that are made, the river and harbor surveys for improvement purposes are beyond all possibility of question the most accurate. These surveys are made almost every year, and this information is all ready for publication whenever the vessel interests ask for it and the necessary small amount of money becomes available for publication purposes.

Do the two survey organizations mentioned by Commander Brice possess such information? They have been working for years on the Atlantic, Pacific and Gulf coasts and the charts which they publish of harbors there, cannot hope to compete in accuracy with the manuscript information on file in the engineer department. These river and harbor maps are the most accurate and reliable made. Why should they not be published for the use of navigators?

Examination of the annual reports of Gen. Poe and of the chief of engineers for a number of years past, will show that the engineer officers in charge of river and harbor improvements are fully alive to what is needed by the vessel interests. Small appropriations have been made from time to time for survey purposes, but there is much work to do and hitherto the appropriations have been too small to make much progress. An annual appropriation of \$50,000 would, in a few years, bring all the charts up to date, and would suffice to keep them corrected thereafter. This is not very much money when the extent of the lake region is considered.

If vessel owners want this work done, congress should be asked to appropriate the money. The matter must be supported before congress if the work is to be done. One organization should do this work and only one. When two organizations are in the field together, work is duplicated and money is wasted, as was the case a year ago at Chicago. If this work is to be done at all, the lake interests must ask that one organization should do it. The argument in favor of the work being done by the navy is a specious one and will not bear close examination. The best navigator is not necessarily the best surveyor, and vice versa. Navigation and surveying in these days of progress have become two separate and distinct arts, whatever they may have been a hundred years ago.

If the vessel interests want the surveys of the lakes conducted on business principles, if they want the most results possible for any money appropriated, let them give their unqualified support to the engineer department, in order that all "river and harbor" surveys may be used for chart purposes. Let this work be continued by the same organization that has been making surveys of the lake region since 1817, and which is now on the spot with all the necessary appliances. Let suggestions be freely made to the engineer department concerning what the lake interests want. The engineer department is the servant of the vesselmen in this matter. Let it have their unqualified support.

CHARLES S. RICKE,

1st Lieut. Corps of Engineers,

SAULT STE. MARIE, Mich., March 27, 1894.

United States Army.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store at the principal points of accumulation on the lakes on March 31, 1894:

| | Wheat, bu. | Corn, bu. |
|----------------|------------|-----------|
| Chicago..... | 20,111,000 | 5,657,000 |
| Duluth..... | 11,298,000 | 261,000 |
| Milwaukee..... | 893,000 | |
| Detroit..... | 1,946,000 | 37,000 |
| Toledo..... | 3,113,000 | 1,112,000 |
| Buffalo..... | 1,128,000 | 425,000 |
| Total..... | 38,489,000 | 7,492,000 |

At the points named there is a net decrease for the week of 50,000 bushels of wheat and a net increase of 944,000 bushels of corn.

Through the incorporation of the Cleveland Tug Company, a few days ago, Messrs. L. P. and J. A. Smith have provided a separate organization for their towing business. Some Cleveland vessel owners have taken stock in the new company, and it is very probable that there will be some severe competition in the harbor towing business during the coming season. The new company proposes to have four of its tugs of the largest class.

There are no stock jobbing plans back of the preparations by the Johnson Steel Company to build a big steel plant at Lorain, O., the Lake Erie port a few miles west of Cleveland. The reorganized company, which will give up almost entirely the present works at Johnstown, Pa., is capitalized at \$5,000,000, and will have a plant that will be exceeded in size only by those of the Illinois Steel Company and the Carnegie Steel Company.

SOME TIME AGO THE MARINE REVIEW PUBLISHED A SHORT HISTORY OF LAKE NAVIGATION, RUNNING THROUGH FIVE NUMBERS. WE HAVE SEVERAL SETS OF COPIES OF THESE NUMBERS, WHICH WE WILL FURNISH AT 50 CENTS. ONE OF THE NUMBERS CONTAINS INFORMATION OF LOCKS OF THE ST. LAWRENCE AND ERIE CANALS, WHICH IS WORTH THE PRICE ASKED FOR ALL OF THE NUMBERS.

Solid Rock Removed Without Blasting.

Dredging contractors on the lakes will be interested in a description, which appeared recently in the London Times, of a type of dredger of such strength and power that it can be operated in removing solid rock without the preliminary operation of blasting. "The latest instance of this method of dredging," says the Times, "is afforded by the new channel leading to the harbor of Alexandria, which had to be excavated for a width of 300 feet through a series of ridges of solid rock extending for about a mile in an open sea-way. The prevalence of a heavy swell greatly added to the difficulties of the work, which, however, was accomplished practically without the use of explosives, and constitutes a unique example of rock-dredging. The work was executed by Messrs. S. Pearson & Son of Westminster, who afterward disposed of the dredger to the government. Having, however, taken a contract for excavating a channel through the rock at Bermuda for the colonial government, the firm has had a new and very powerful steam dredger designed, which embodies various improvements suggested by experience at Alexandria and elsewhere.

"This is an 800-ton hopper dredger, and is being built and engined by Messrs. Lobnitz & Co. of Renfrew. The vessel is 208 feet long over all, with a breadth of 40 feet, a depth of 17 feet 3 inches and a displacement when loaded of 2,200 tons. She is entirely steel built and will be capable of steaming to any part of the world at a speed of seven knots. She will be propelled by twin screws, driven by independent triple-expansion engines of 800 H.P. The dredging gear, ladder and bucket chain are probably the strongest ever made. They are of steel and weigh together about 100 tons. The bucket chain will be driven by an independent compound surface-condensing engine of special construction with 16-inch and 30-inch cylinders respectively and a 2-foot stroke, and working at 100 pounds pressure. Steam for the engines will be provided by two cylindrical steel boilers of the return tubular type of 1,000 H.P. combined. They are arranged independently, so that one can be cleaned out while the other is in use for dredging. All the dredging gear will have such an excess of strength that it will pull up the engine if any impediment is met with in working, and a breakdown will thus be avoided. The bucket ladder is fitted with ten powerful buffer springs, which will cushion any shocks that may be experienced when the dredger is working in a sea swell. By an interchange of wheels dredging can be affected at three different speeds to suit the degree of hardness of the materials met with. The vessel will dredge to a depth of 45 feet below water level, and she will be able to cut 'her own flotation'—that is, she will cut her way through a bank above water level. The dredged material will be delivered by the buckets through shoots into steel hoppers on either side of the vessel, each of which is capable of containing 7,000 cubic feet of spoil, or it may be delivered into barges alongside by altering the shoots. The vessel will also carry a special rock cutter for use in cases where the rock may prove exceptionally hard. She is likewise arranged for dredging in soft ground, and when cutting a channel such as a canal, she will deliver the dredged materials on the shore on either side. A titan steam crane will be mounted on deck for moving any of the heavy parts for examination or repair, and there will be a set of artificers' shops, so that all ordinary and even heavy repairs can be executed on board."

Costs in New Work and Maintenance of Canadian Canals.

Special Correspondence to the MARINE REVIEW.

KINGSTON, Ont. April 5.—The Canadian government has expended in constructing and enlarging its canals, from 1867 to 1893, the sum of \$59,210,131. Maintenance, repairs, staffs, etc., have cost \$71,310,793, while the revenue received amounted in the aggregate to only \$9,850,578. The government reports that last season the number of tons of freight moved on the Welland canal was 955,554, of which 528,569 tons were agricultural products. On the St. Lawrence canals the quantity moved was 966,735 tons, of which 464,672 tons were agricultural produce. There passed to Montreal by way of the Welland and St. Lawrence canals 261,954 tons of grain, and of this quantity 195,244 tons were exported. The number of tons of grain passing down the Welland canal from United States ports to United States ports was 201,540. The amount of refunds of tolls on grain and other food products was \$40,032, as compared with \$52,270 the previous year. Of the 268,830 tons of grain which was discharged at Kingston, Canadian vessels carried 159,000 tons and United States vessels 109,000 tons. Only 4,341 tons were taken to Ogdensburg and transhipped to Montreal.

The people of St. Catharines had a big fright last week. When the dismissals of employes on the Welland canal occurred it was thought the old canal would be shut up and St. Catharines would be an inland town. A big delegation was selected and the members journeyed to Ottawa to see the minister of canals. That gentleman said he had no intention of cutting St. Catharines off and that a sufficient staff would be maintained to give St. Catharines every connection by water it desired.

Port Dalhousie back light tower has been moved 26 feet N. $\frac{1}{4}$ E., and is now 324 feet from the outer end of the east pier and 298 feet from the front range light.

Some Appointments of Masters and Engineers.

Johnson, H. J., Cleveland, O.: Steamers—H. J. Johnson, Capt. Charles Miner, Engineer Dan Connally; V. Swain, not in commission. Schooner—Helvetia, Capt. Frank Rice.

Grummond Line, Detroit, Mich.: Steamers—State of Michigan, Capt. Fred R. Dale; Flora, Capt. David Brown; Atlantic, Capt. Robert E. Ferguson. Tugs—Champion, Capt. James F. Jarvis; M. Swain, Capt. James R. Torney; Crusader, Capt. Thomas Carney.

Pack, Gray & Co., Cleveland, O.: Steamers—Simon Langell, Capt. Harry Zealand, Engineer Anthony Ryan; Kalkaska, Capt. Henry Fish, Engineer George Miller. Schooner—Arenac, Capt. Henry Davis.

Rhodes, R. R., Cleveland, O.: Steamers—Neshoto, Capt. W. H. Humphrey, Engineer Thomas Malloy; Neosho, Capt. Dowdell, Engineer Burns; R. R. Rhodes, Capt. Truman Moore, Engineer R. D. Mayburry; Siberia, Capt. Morse, Engineer C. Willows.

Canadian Steel Barge Co., Port Arthur, Ont.: Steamer—Algonquin, Capt. J. McMaugh, Engineer T. Brisbin.

Lehigh Valley Transportation Company, Buffalo, N. Y.: Steamers—Tuscarora, Capt. M. H. Murch, Engineer D. Masten; Saranac, Capt. J. M. Todd, Engineer H. N. Wadleigh; Seneca, Capt. D. Driscoll, Engineer E. Hull; E. P. Wilbur, Capt. James A. Brown, Engineer M. H. Clark; Cayuga, Capt. G. Graser, Engineer A. J. Jones; Oceanica, Capt. James Todd, Engineer C. Nise; Lacoma, Capt. Wm. Williams, Engineer J. H. Lord; Clyde, Capt. A. J. Talbott, Engineer R. Fleming.

Sullivan, L. S., Toledo, O.: Steamer—D. W. Rust, Capt. Wm. J. Leaver, Engineer P. J. O'Neil. Schooners—C. C. Barnes, Capt. Frank Nixon; John Schuette, Capt. John O. Johnson.

Hadley and Burdick, Toledo, O.: Steamers—G. G. Hadley, Capt. D. H. Mallory, Engineer N. C. Walker; Panther, Capt. T. D. Gibson, Engineer Leander Corns. Schooners—Massasoit, Capt. C. L. Goodsite; Penokee, Capt. P. J. LaVoo.

Whitaker, B & Sons, Detroit, Mich.: Steamer—B. Whitaker, Capt. Augustus Ames, Engineer Jacob Sutter. Schooner—S. V. R. Watson, Capt. Alfred Eades.

Vessels laid up at Lake Ontario and River St. Lawrence ports: Steamers—Resolute, Capt. John Gowan, Engineer James Harrison; Reliance, Capt. James Dougherty, Engineer Geo. Boyd; Ella Ross, Capt. D. Cristie, Engineer John McFaul; Deseronto, Capt. Skillen, Engineer John Rice; Van Allen, Capt. John Thompson, Engineer J. A. Wallace; Iona, Capt. John D. VanAlstine, Engineer C. Merien; Melbourne, Capt. Chesnut, Engineer Thomas Milney; Arabian, Capt. Papinaw, Engineer T. Huff; Monteagle, Capt. Wm. Griffin, Engineer F. E. Wheeler; Hecla, Capt. Daniel Hourigan; Active, Capt. John Gaskin; Bronson, Capt. Joseph Murry, Engineer Robert Hepburn; Glide, Capt. Chas. Martin, Engineer William Spencer; Glengarry, Capt. J. W. Maudsley, Engineer Chas. McSurley; James A. Walker, Capt. John Boyd, Engineer Robert Marshall; D. G. Thompson, Capt. James Murray, Engineer George Henderson; Bannockburn, Capt. Archie McMaugh, Engineer Henry Thurst n; Louise Hall, Capt. James Martin, Engineer Alex Barton; John B. Ketchum, No. 2, Capt. M. Christie, Engineer Fred Tuifler; Alexander, Captain Smith; Empress of India, Capt. George O'Brien; Aberdeen, Capt. M. Heferman; Water Lily, Capt. William Ostrander. Schooners—E. H. Ruthford, Capt. R. Snetsinger; Katie Eccles, Capt. James Shaw; Keewatin, Capt. James Redfearn; Fleet Wing, Capt. M. Shaw; Annie Falconer, Capt. John Cornwall; Robert McDonald, Capt. L. Mathews; Jessie Drummond, Capt. Hugh Rooney; Eliza White, Capt. James Slamon; Herbert Dudley, Capt. M. McGuanic; Loretta Rooney, Capt. Wm. Mathews; Speedwell, Capt. Richard Edmunds; F. H. Burton, Capt. Thomas Fox; Oliver Mitchell, Capt. Matt. Hourigan; Mist, Capt. John Annal; West Side, Capt. James Gibson; M. T. Downing, Capt. John McDowell; America, Capt. John McDermott; Kate, Capt. F. K. Dewetty; Julia, Capt. Horn; J. R. Noyes, Capt. James Brackin; J. E. Hall, Capt. T. Donovan; Albicore, Capt. James Braund; M. A. Lyden, Capt. G. W. Robertson; Oliver Mowat, Capt. James Peacock; Garabaldi, Capt. John Breen; Marie Annette, Capt. Robert Heming; Eliza Fisher, Capt. R. Rankin; Two Brothers, Capt. M. McCrimins; Annie Minner, Capt. James Savage; Wave Crest, Capt. D. Corsan, Starling, Capt. M. Mullin; Annandale, Capt. Frank McMasters; H. M. Ballow, Capt. Smith; O. S. Storrs, Capt. John Yott; Delaware, Capt. Wm. Montgomery; S. H. Dunn, Capt. John Dix; Grantham, Capt. Thomas Crawford; B. W. Folger, Capt. Daniel Baits; Queen of the Lakes, Capt. N. Allen; Flora Carveth, Capt. Wm. Wakely; Fabiola, Capt. T. Ostrander; S. and J. Collier, Capt. Joseph Phelps, Jr.; Nellie Hunter, Capt. W. Wellbanks; Ishpeming, Capt. C. H. Ripson; D. G. Fort, Capt. Wm. Andrews; G. G. Houghton, Capt. John W. Carr.

IF YOU SEND 50 CENTS TO THE MARINE REVIEW, NO. 516 PERRY-PAYNE BUILDING, CLEVELAND, O., AND YOU ARE NOT SATISFIED WITH THE BOUND VOLUME OF FIFTEEN PHOTOTYPES OF LAKE STEAMERS THE MONEY WILL BE REFUNDED TO YOU.

MARINE REVIEW.

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

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FOR several years past some of the leading men in the iron and steel business of the central west have held that, on account of the steady reduction in the cost of producing and transporting iron ore from the Lake Superior region to Lake Erie ports, a large number of the leading plants engaged in the manufacture of iron and steel would soon be located in Cleveland, Ashtabula and other Ohio ports on the south shore of Lake Erie. The low cost of fuel in and around Pittsburg and the Mahoning valley in Ohio, was no longer an item of sufficient importance, it was claimed, to counteract the reductions in the value of iron ore that have finally resulted this year in the best grades of the Bessemer product being sold at \$2.25 and \$2.50 a ton. The opinion that the Ohio shore of Lake Erie is the most advantageous meeting place for fuel and ore seems to have been the most important factor in causing one big corporation, the Johnson Steel Company, to close negotiations last week for immense tracts of land at Lorain, just west of Cleveland, and begin preparations with a capital of five millions, to erect a big steel plant. There is no wind or false show back of the negotiations to which the newspapers have given so much attention within the past few days. The concern is almost as well known in the steel business as the Carnegies and the Illinois Steel Company. The ores of Lake Superior will be landed by vessels at the very doors of its furnaces, and in this lies its greatest advantages. Let other steel works follow.

IN ANOTHER part of this issue, Lieut. Chas S. Riche, corps of engineers United States army, refers at some length to survey work on the lakes, upon which members of the engineer corps have been engaged for some time past, and the advantages of continuing this work under the direction of the army engineers. The communication was prompted by some statements made by Commander Brice, U. S. N., in an article treating of lake navigation. Commander Brice suggested an entire resurvey of the lakes and would have the work done by naval officers. Lieut. Riche's answer to Commander Brice's article might be taken in part as indicative of the general rivalry between army and navy officers, but in this matter of new surveys the work of the army officers as far as it has progressed under limited appropriations is highly satisfactory to the vessel owners, and no better proof of this is needed than the numerous recommendations made by the Lake Carriers' Association in support of a continuation of liberal appropriations. The executive officers of the association, who are acquainted with the details of the work, have commended it highly on several occasions. Let there be no interference with good service.

CONGRESSMAN Jerry Simpson, who knows something about lake business, advances another suggestion, to go with the many that have emanated from Washington statesmen, for a direct ship-canal route from the lakes to the Atlantic seaboard. His scheme contemplates a pooling of interests by the United States and Canada in a project for a canal connecting Georgian bay on Lake Huron with Lake Ontario at Toronto, thence across the lake to Oswego, thence through United States territory by way of Lake Oneida and the Erie canal to the Hudson river and New York. The route is all right, and the construction of the Huron-Ontario canal would undoubtedly prove a great advantage in cutting off the long haul through the St. Clair and Detroit rivers, Lake Erie and the Welland—however much Lake Erie ports might be injured by a loss of terminal business—but the rub is in the proposed pooling of interests with Canada. The dominion government is not liable to enter into a canal scheme that would divert export business from Montreal, and it is not probable that a union in canal matters can ever be effected without a general union between the two countries.

REFERRING to the action of municipal authorities at several places around the lakes, in going to the extremes to enforce heavy taxation on vessel property, the New York Maritime Register very appropriately says; "Taxation of the profits of a vessel owning company, or a vessel owner in the place of residence is equitable. Beyond that, taxation of vessel property should not go. Neither state, county nor town controls navigable waters, and upon these is the vessel used. Whenever necessary these are kept in condition or safeguarded by federal, and not by the state authorities, and the terminals used by vessels are already taxed. The vessel brings business to a town and uses nothing in the town that is not already taxed, and gets nothing from the town, for the latter has nothing to give the vessel."

NO BUSINESS in this country is more directly concerned, as a whole, in the acts of congress than the shipping business, and yet, as one of the New York journals is in the habit of remarking very often, there are too many lawyers in congress to permit of the ship owner being fairly represented. What is wanted on the coast, as well as the lakes, is representation in Washington by men of practical experience in the shipping business. With all the vast interests in ships, mines, docks, grain and lumber on the lakes, no united effort has ever been made to have the millions involved in these various branches of commerce represented as they should be in the halls of congress.

WITHIN the past few days, Secretary Keep of the Lake Carriers' Association has distributed, to all vessel agents at lake ports where grain is shipped, supplies of a new form of bill of lading for grain cargoes. In behalf of the association, the REVIEW desires to direct the attention of members of the association to the fact that this bill of lading is the one adopted at the last annual meeting of the association, and masters should be instructed to require it for all grain cargoes carried. The change in the form of bill that has been used quite generally in past seasons is slight, but it is important, and it is also important to have uniformity in this matter.

PRESIDENT Uhler of the Marine Engineers' Beneficial Association was in Cleveland Monday, and with some of the leading members of the local organization called on Capt. George P. McKay of the Lake Carriers' Association, to talk over some questions concerning the dealings of owners with engineers. The most important matter brought up was a suggestion from the engineers that they be given a hearing with representatives of the vessel owners in the formation of the wages schedules. Of course, Capt. McKay could simply note the opinions expressed by the delegation. He will bring the matter before the next regular meeting of the finance committee of the Lake Carriers' Association.

A FOOT note attached to a letter received from Waldoboro, Me., a few days ago, tends to show, very forcibly, the decline in the great wooden ship building industry of the Badger state. The letter is from A. R. Reed, once a ship builder in the town referred to. He says: "This was formerly a ship building place, but has ceased to be such. Last year the writer, who was the last of the builders here, ploughed up his ship yards, converting them into grass fields, after they had been in use by the family nearly one hundred years."

A CORRESPONDENT is desirous of learning something about the first shipment of oil made by water direct from the lake to the Atlantic seaboard and to foreign ports. The name of the first vessel to engage, in this trade, or any other information about the earliest shipments of oil, would prove interesting, and we will be thankful to any of our readers for whatever information they may have on the subject.

Lake Freight Matters.

A few single trip charters for Escanaba ore, to be brought down immediately upon the opening of navigation, have been made during the past few days at 50 cents, and one block of 40,000 tons of Marquette ore, to go to Tonawanda, was taken for boats managed by Alvin Neal of Port Huron at 80 cents. This is the only business heard of in iron ore circles. There is no more 80-cent ore offering from the head of Lake Superior, and although the production and consumption of pig iron, especially in the Pittsburg and Mahoning Valley districts, has increased until it is nearing the maximum, there are no new features of encouragement, on account of the surplus stocks of ore from which the furnaces are being supplied.

It is reported that the Mountain Iron Company, owning the greatest of the Rockefeller syndicate mines on the Missabe, is offering its best ore for \$2.25 a ton, and if such is the case, the other Missabe companies having royalties to pay will undoubtedly find it difficult to do a great deal in the market, even if later developments are more favorable to Missabe purchasers.

On single cargoes of coal 40 cents is being paid to Milwaukee, but there is an effort to establish a Lake Superior rate considerably lower than that figure. Nothing has been done in the way of coal contracts, and prospects in the coal business are by no means encouraging. Estimates made by shippers on the aggregate amount of soft coal at Duluth, Superior and Ashland range all the way from 400,000 to 600,000 tons.

Opening of the Straits.

As a matter of record, a note is made here of the opening of the Straits of Mackinaw in 1894. The real opening was on Monday last, April 2, when the big wooden steamer Ferdinand Schlesinger, leading a few boats of the Chicago grain fleet, passed from Lake Michigan to Lake Huron at 11:30 a. m. A fish tug had passed through on Thursday last, March 29. Taking either case, the opening is the earliest since 1878, when the passage was made March 15.

Notes and Queries on Engineering Subjects.

CONDUCTED BY GEO. C. SHEPARD.

Since the publication in the last issue of the indicator diagrams of the SS. City of Puebla, we are in receipt of the information that the cylinders from which they were taken were steam jacketed on the side and bottom; likewise the receiver space, which was between the two cylinders and equal in volume to five times the volume of the H.P. cylinder. The valves, instead of being of the Corliss type, were of gridiron slide valve pattern, one valve for each function or four valves to each cylinder, all moved by Corliss gear. These jackets put a different aspect on the diagrams and account, in a measure, for the theoretical expansion curve falling below the expansion curve of the diagram. The formula for the expansion curve would be modified but would not show any appreciable difference in the expanded diagram. On account of this additional data we hold the correspondence on this matter over to our next issue to give the writers an opportunity to modify their views and computations to meet this fact.

When water is heated in the ordinary way by applying heat to the bottom, the lowest layer of water becomes hot first and by its expansion becomes lighter than the colder water above and gradually rises, so that a gentle circulation of water is kept up and the whole water is gradually warmed, though the lowest layer is always the hottest. At last the water in contact with the heated metal becomes so hot that in spite of the pressure of the atmosphere on the surface of the water, the weight of the water itself and the cohesion of the water, some of the water at the bottom is converted into steam, forming a bubble adhering to the bottom of the vessel. As soon as the bubble is formed, evaporation goes ordinarily from the water all around it, so that it soon grows large and rises from the bottom.

While heating the water from 60° temperature, for instance, each unit of heat transmitted through the plate will raise the temperature of a pound of water one degree until the temperature of the water reaches that of the boiling point, due to atmospheric pressure. The action of boiling takes place but the temperature of water remains the same until all the water is converted into steam, and this takes place only after 966 units of heat has been transmitted to the water at atmospheric pressure. In case the water is in a closed vessel, as in a boiler, the first bubbles of steam are evolved as in an open vessel, but as the pressure on the surface of the water is increased by this same steam, the temperature to which the water must be raised before more steam forms is increased, while the heat necessary to overcome the cohesion of all the water and separate it is less as the pressure rises. Taking water at 32° and converting it into steam at 212°, Isherwood thus divides the work: Representing the total as 100, we have expended in raising the temperature of the water from 32° to 212°, 15.776 per cent.; in increasing the volume of water between 32° and 212°, .0002 per cent.; destroying the cohesion of the water, that is converting it into steam, 77.49 per cent., and increasing the volume of the water to that of steam 6.282 per cent.

Now all of the heat that the water has received has been expended in producing and maintaining a change of state, and it can perform no external work without a change of condition. It contains just heat enough to maintain it as steam, and the total amount of work done upon it is accounted for by its change of state from water to steam, and the moment it is called upon to do work it gives up some of the heat necessary to maintenance of its permanent state and undergoes liquifaction. The same thing takes place if heat is withdrawn by other means than by the performance of work. There is actually no heat in the steam but sensible heat, or that to be measured by the thermometer. For instance, with steam at 150 pounds guage pressure the sensible heat is 365.73°, while the latent heat is 855.7°, but this latter has wholly disappeared in the work of breaking up the water and represents the 77.9 per cent. before mentioned. The mere separation of the particles is not sufficient, for under the external pressure they tend to run together and the presence of heat is necessary to prevent this. As before stated, if there is any loss of heat there is liquefaction and the particles incoming together give up the whole of the work expended in separating them and this reappears as heat, and this heat unless withdrawn in its turn prevents further liquefaction from taking place.

In a steam cylinder, then, of ordinary construction liquefaction must take place after the steam is shut off and the steam begins to work expansively, and this liquefaction is increased by the withdrawal of heat through conductivity of the cylinder walls. Some of this is re-evaporated by the reduction of the pressure before the end of the stroke and on the return stroke more is re-evaporated by the heat due to compression.

Illustrated Patent Record.

SELECTED ABSTRACTS OF SPECIFICATIONS OF A MARINE NATURE—FROM LATEST PATENT OFFICE REPORTS.

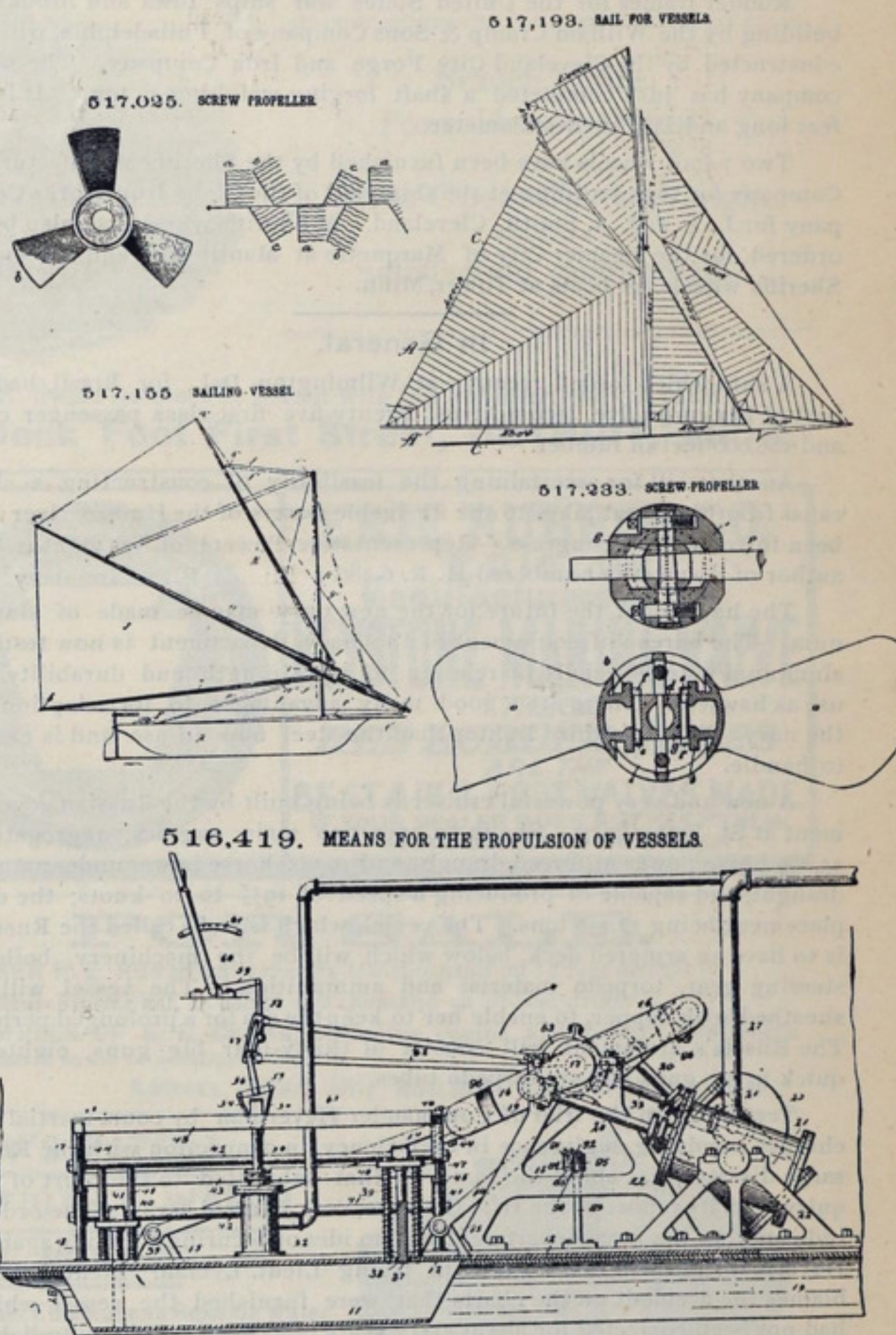
517,025. SCREW PROPELLER. Alfred W. Case, Highland Park, Conn. Filed July 5, 1893. Serial No. 479,557. (No model.)

Claim.—A propeller consisting of a hub, and a plural number of blades set upon the hub on the pitch of a screw, a portion of said blades

projecting out from the hub at right angles to the axis, and a portion projecting from the hub obliquely to the axis of the propeller.

517,155. SAILING VESSEL. John M. Boorman, Hempstead, N. Y. Filed April 1, 1893. Serial No. 482,130. (No model.)

Claim.—The combination with the hull A and the hollow water-tight outrigger C, placed parallel or substantially so with said hull at a suitable distance therefrom, of the mast B, bowsprit G, and main sail J, the main boom H provided with the longitudinal tracks, a^4 , the branch booms K and L, the sleeves I I', anti-friction rollers placed within said sleeves and arranged to traverse said tracks, means for the pivotal attachment to said sleeves of the adjacent ends of the branch booms and sheets for actuating said sleeves and for raising and lowering the booms.



517,193. SAIL FOR VESSELS. Thomas W. Ratsey, Cowes, assignor of two-thirds to Edwin Laphorn, George Rogers Ratsey, and Edwin Walter Laphorn, Gosport, England. Filed March 20, 1893. Serial No. 466,856. (No model.)

Claim.—As a new article of manufacture, a sail constructed in two portions and having a diagonal seam, the warp of the fabric of one portion standing perpendicular to the leech, and the warp of the fabric of the other portion standing perpendicular to the foot, whereby stretching of the sail is prevented.

517,233. SCREW PROPELLER. Fritz Otte, Altona, Germany. Filed July 12, 1893. Serial No. 480,248. (No model.)

Claim.—In combination with the shaft d , the block g fixed thereto and having grooves f in opposite faces, the boss c carried by the shaft, the propeller blades b pivotally secured within the boss and projections e engaging the grooves.

516,419. MEANS FOR THE PROPULSION OF VESSELS. William H. Witte, Long Island, N. Y. Filed March 25, 1893. Serial No. 467,583. (No model.)

Claim.—The combination, with the hull of a vessel, and the open ended pipe thereon, of the reciprocating slide plate to move opposite the inner side of the pipe and the piston carried with the slide plate and held to move through the pipe and also adapted to move into and out of the pipe, oppositely arranged magnets provided with armatures adapted to move the piston into and out of the pipe, conducting tracks arranged parallel with the slide plate, conductors carried by the slide plate and adapted to engage the tracks, electrical connections between the conductors and the magnets, electrical connections to supply electricity to the tracks, and mechanism for reversing the current through the magnets.

Trade Notes.

Stanley B. Smith & Co. announce that they are in readiness to supply vessels with fuel at their Lorain dock, as well as on the Detroit river.

Thos. Drein & Son, Wilmington, Del., recently shipped three 22-foot patented, beaded-bottomed, metallic life boats to the Anchor Line, Buffalo, and they are building three more boats of the same length for the same line.

Almy water tube boilers will be used in the fast McElroy boat, for which the Frontier Iron works of Detroit is building quadruple engines, and also in the steam yacht of 850 horse power, building at the Atlantic Works, East Boston, for George E. Fabyan of New York.

Rudder frames for the United States war ships Iowa and Brooklyn, building by the William Cramp & Sons Company of Philadelphia, will be constructed by the Cleveland City Forge and Iron Company. The same company has just completed a shaft forging weighing 42 tons. It is 40 feet long and 24½ inches diameter.

Two 7-foot wheels have been furnished by the Sheriffs Manufacturing Company for tugs building at the ship yard of the Globe Iron Works Company for L. P. & J. A. Smith, Cleveland. A Sheriffs wheel has also been ordered for the steamer City of Marquette at Manitowoc, and two small Sheriffs wheels for boats at Tower, Minn.

In General.

A ship which loaded recently at Wilmington, Del., for Brazil, had as part of her cargo five locomotives, twenty-five first-class passenger cars and 180,000 feet of lumber.

Another bill for ascertaining the feasibility of constructing a ship canal from the great lakes to the navigable waters of the Hudson river has been introduced in congress. Representative Powers of Vermont is the author of it and it is numbered H. R. 6480.

The hawsers of the future for the new navy may be made of aluminum. The bureau of equipment of the navy department is now testing aluminum wire especially in relation to its strength and durability for use as hawsers. There are a good many advantages to its adoption by the navy. It is one-third lighter than the steel now in use and is easier to handle.

A new and very powerful cruiser is being built by the Russian government at St. Petersburg. She is to have two main engines, aggregating 15,000 horse power at forced draught and 10,000 horse power under natural draught, and capable of producing a speed of 19½ to 20 knots; the displacement being 12,230 tons. The vessel, which is to be called the Russia, is to have an armored deck, below which will be the machinery, boilers, steering gear, torpedo material and ammunition. The vessel will be sheathed with copper, to enable her to keep the sea for a prolonged period. The Russia's armament will consist of thirty-four big guns, eighteen quick-firing guns and six torpedo tubes.

Testimony in the trial of Commander Heyerman by court martial on charges involving negligence in inefficiency, in connection with the Kearsarge disaster, was about the same as that submitted to the court of inquiry. In its report of the trial the New York Herald says: "The orders indicate that the navy department has no idea of securing a finding against Heyerman, and will lose no time in trying Lieut. Lyman. Lieut. Lyman blames the accident on the charts that were furnished the vessel, which had not been corrected for about sixty years, and were wholly unreliable, as far as they have information about currents."

Another Chapter on the Belleville Boiler.

Now that the British admiralty has adopted the Belleville boiler for some of the largest naval vessels under construction, it may be that the United States navy will give more attention to tubulous boilers. It must be admitted, however, that the engineers of our navy have appeared at least a little negligent in investigations relative to tubulous boilers, and it has been claimed that in the case of the Belleville boiler this negligence has been prompted by some hidden cause. The principal argument in the navy against tubulous boilers is in regard to the short life of the tubes, and as the REVIEW has printed a great deal of matter favorable to the Belleville boiler, it may not be out of place here to reproduce some data bearing on the stand taken by our naval engineers. The following is an extract from an article printed in the Journal of the Royal United Service Institution in January, 1891, since which time it must be allowed, however, a great many improvements have been made in the boiler in question:

"In the course of the last ten or twelve years, with the constant increase of steam pressure, it has been observed that the life of the marine boilers has become shorter and shorter, especially with pressures in excess of 90 pounds per square inch. The destruction of the boilers has arisen chiefly from leaks in the seams of the furnaces and of the fire boxes. Even with well made boilers it frequently happens that furnaces, fire boxes and tube plates have to be renewed after three years' service.

These costly repairs necessitate the idleness of the vessel for a considerable period of time. Accordingly, in 1884, the Messageries Maritimes Steamship Company determined to try Belleville boilers, and ordered from the Belleville works boilers for the new vessel the Ortegat, then under construction. The hull and engines were built at La Ciotat, near Marseilles, at the yard and works of the Messageries Maritimes. The boilers were made at St. Denis, near Paris, at the Belleville works.

The principal dimensions of the ship were: Length, 337 feet 10 inches; beam, 45 feet 5 inches; draught (mean), 20 feet 8 inches; displacement (load), 5,850 tons. Engines and boilers.—Diameter of H. P. cylinder, 36 3-16 inches; diameter of L. P. cylinder, 64 5-16 inches; stroke 43 5-16 inches; steam pressure, 90 pounds; number of boilers, 8; space occupied by boilers fore and aft, 32 feet 8 inches; area of grate surface, original, 243 square feet, diminished, 181 square feet; heating surface, 6,943 square feet.

The trials of the engines and boilers of the vessel were carried out in April, 1885, and the runs on the measured mile gave the following results: Number of revolutions per minute, 81.9; speed in knots, 13.38; I. H. P., 2,110.5; mean draught, 14 feet 2 inches; area of immersed midship section, 521.32 square feet.

The first trip was from Marseilles to London and back, from the 8th to 29th of May, 1885. In the course of this trip the vessel was under steam 396 hours and the total run was 4,146 miles. When the vessel started, both from Marseilles and from London, the boilers were filled with fresh water, and during the trip the inevitable loss of water in the boilers was made good by taking in sea water. The blowing off of the boilers was carried on uninterruptedly, and although the saltiness of the water did not exceed 6 degrees (with the salinometers used in France 0 degrees corresponds with the density of distilled water, and 10 degrees to the density of water completely impregnated with salt), saline deposits occurred on the lower surfaces of the four lower rows of tubes. On the run from Marseilles to London twenty tubes were burnt. On inspection in London saline deposits five-sixteenths of an inch thick were discovered on the lower surfaces of the tubes. On the return journey to Marseilles these experiences were repeated, and again twenty tubes were burnt. This experiment of making good the loss of water in the boilers by filling up with sea water, even on an uninterrupted run of only 2,000 miles, appeared to be thoroughly unsatisfactory, a conclusion to which M. Belleville was compelled to acquiesce; for during the above trips an engineer from M. Belleville's works was on board, and it was therefore impossible to ascribe the unsatisfactory results to the carelessness of the engineers of the Ortegat. The Ortegat never made a trip from France to South America and back trying her boilers exclusively with sea water, as M. Dubois stated before the naval technical committee.

"From the 8th of June to the 11th of July, 1885—that is, after the vessel had made 4,116 miles, feeding her boilers with salt water—the following alterations were carried out: The two lower rows of tubes in all the boilers were changed, but the original thickness of the tubes (5 mm) was adhered to. The water levels were reduced by 14 cm., and the direction into the purifying reservoirs for the steam and for the feed water was changed. The smokepipe was furthermore divided into four parts by means of a cross-shaped partition. Each part served to carry off the products of combustion of two boilers. At the same time measures were taken to diminish the loss of fresh water, and to insure the supply of the boilers with distilled water.

"Service of the vessel from July 11, 1885, to Feb. 14, 1889.—With boilers fed exclusively with fresh (distilled) water the Ortegat made two trips from Marseilles to London and back, one trip from Marseilles to Bordeaux, and ten trips from Bordeaux to the coasts of La Plata and back. In the course of these trips the steamer ran 112,807 miles, and was under steam 13,020 hours or 542½ days.

"Repairs to boilers and their appliances.—From Oct. 7 to November 1, 1885, the 100 patent furnace bars were repaired. The doors closing the space in which the boiler tubes are situated were lagged with asbestos and wood. The back bridges of the boilers were repaired and 33 kilogrammes of zinc were placed in each boiler. The zinc is placed in the collectors of the feed water, and in the reservoirs for purifying the steam and the feed water. From March 18 to July 11, 1886, all the sections were taken out of the boilers, and 520 rings at the junctions of the tubes with the boxes and 128 tubes were cut out. The two lower rows of tubes in all the boilers were replaced by thicker ones, viz., with 10 mm. tubes in place of 5 mm. tubes. This alteration was made at M. Belleville's instigation, but was not called for by the unserviceableness of the tubes. The outer casings of the boilers and smoke boxes were repaired, as they had become bent. The former, moreover, appeared weak and had to be strengthened with additional angle irons. The area of the grate surface was diminished from 243 square feet to 180.9 square feet in order to make the combustion more effective, and thus to increase the efficiency of the circulation of the water. An area of 180.9 square feet corresponds to 1,160 I. H. P., by developing which the steamer makes its long runs with a mean speed of 10½ knots. The cross-bars of the grates and ash-pits were repaired.

[To be continued.]



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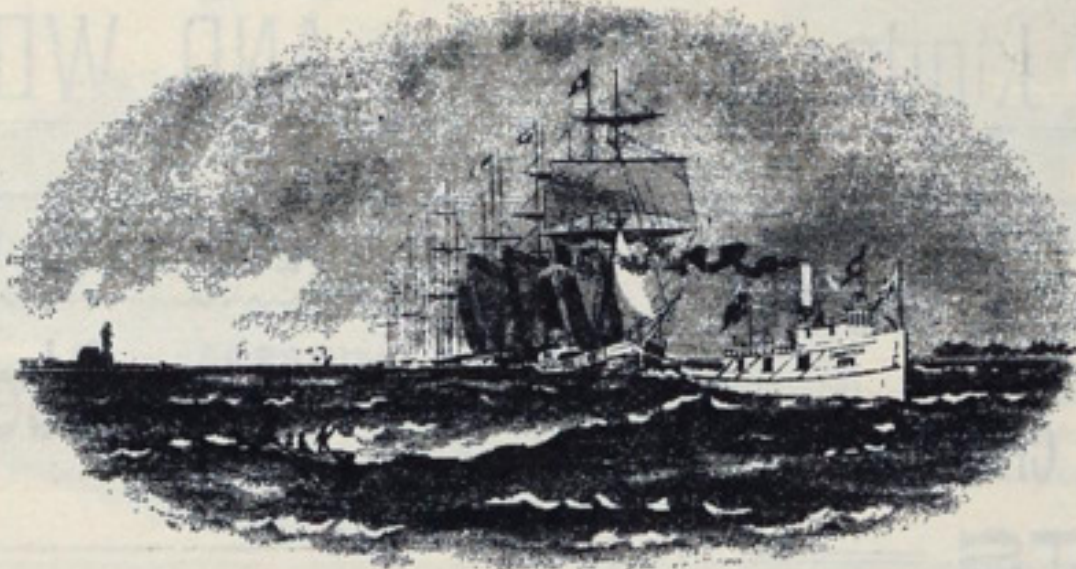
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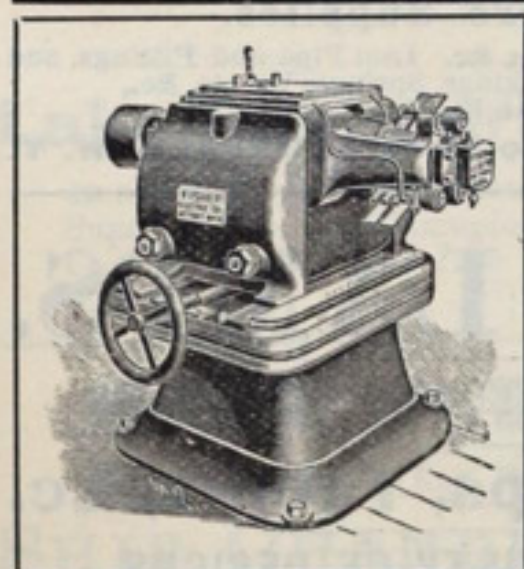
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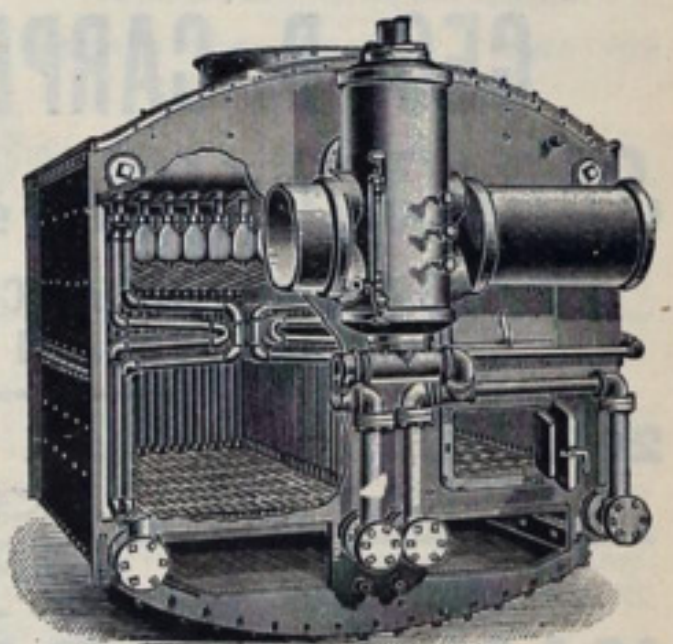
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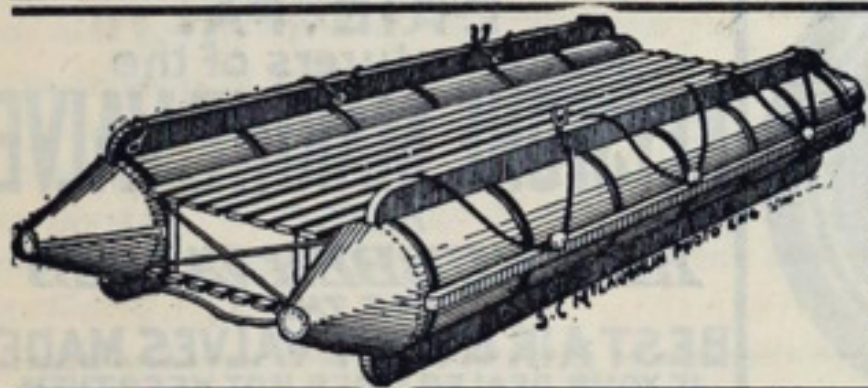
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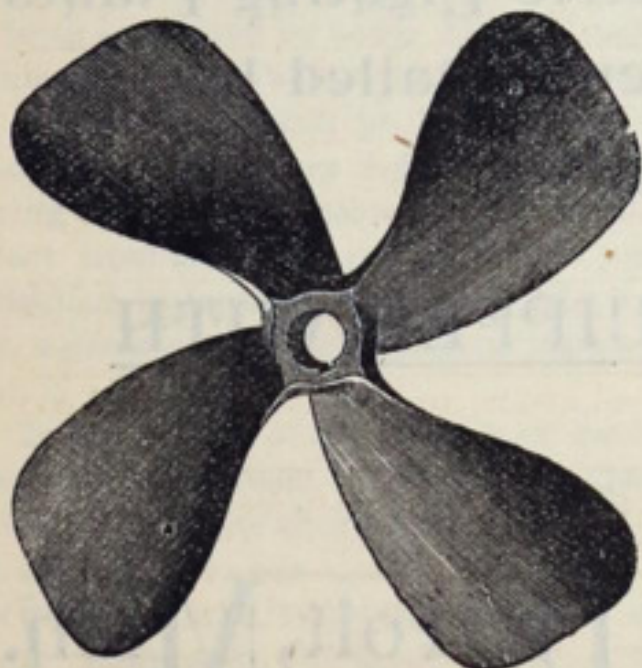
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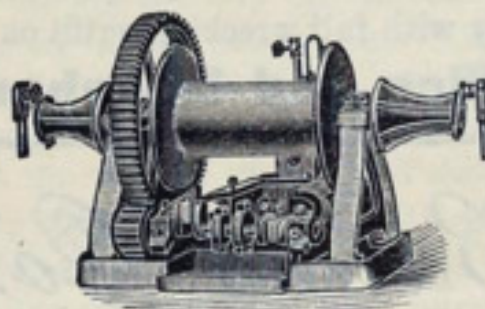
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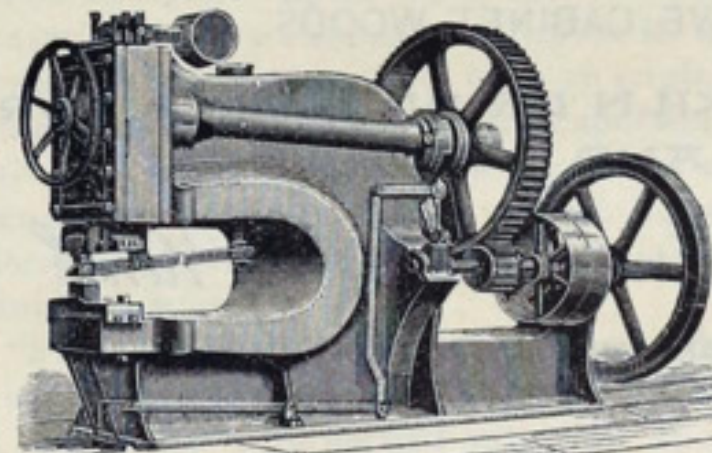
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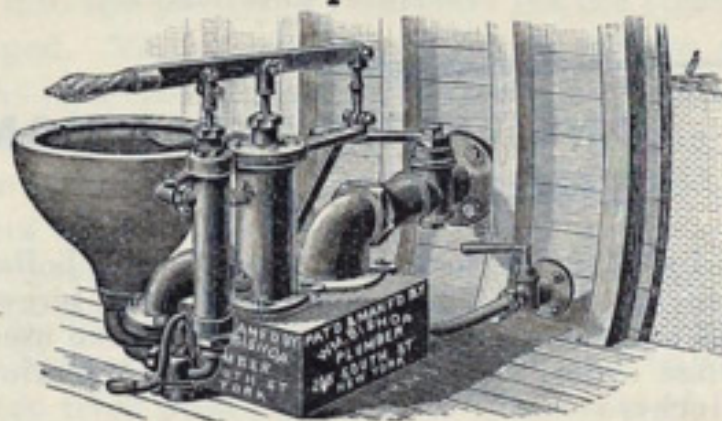
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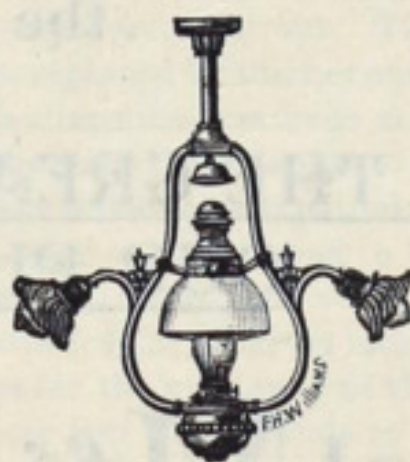
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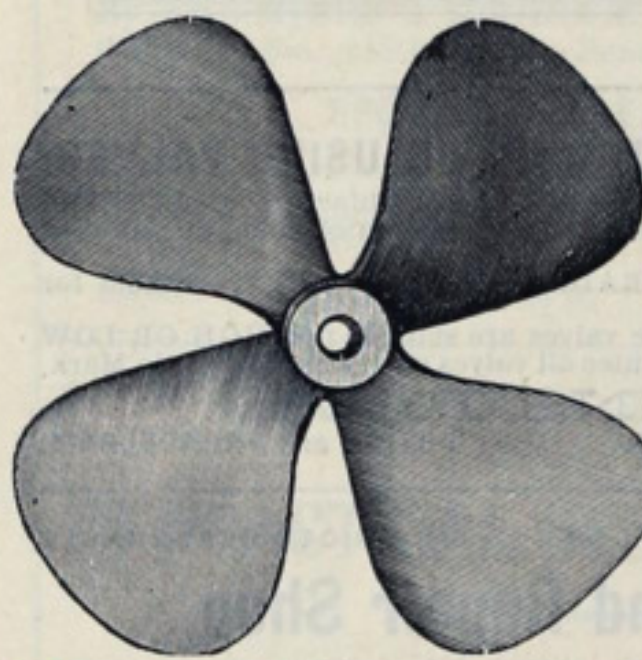
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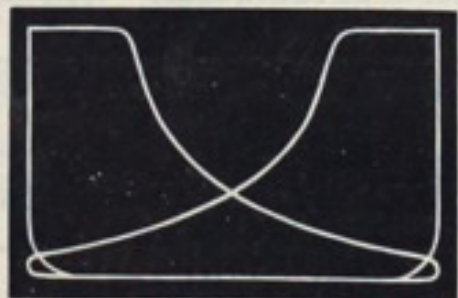
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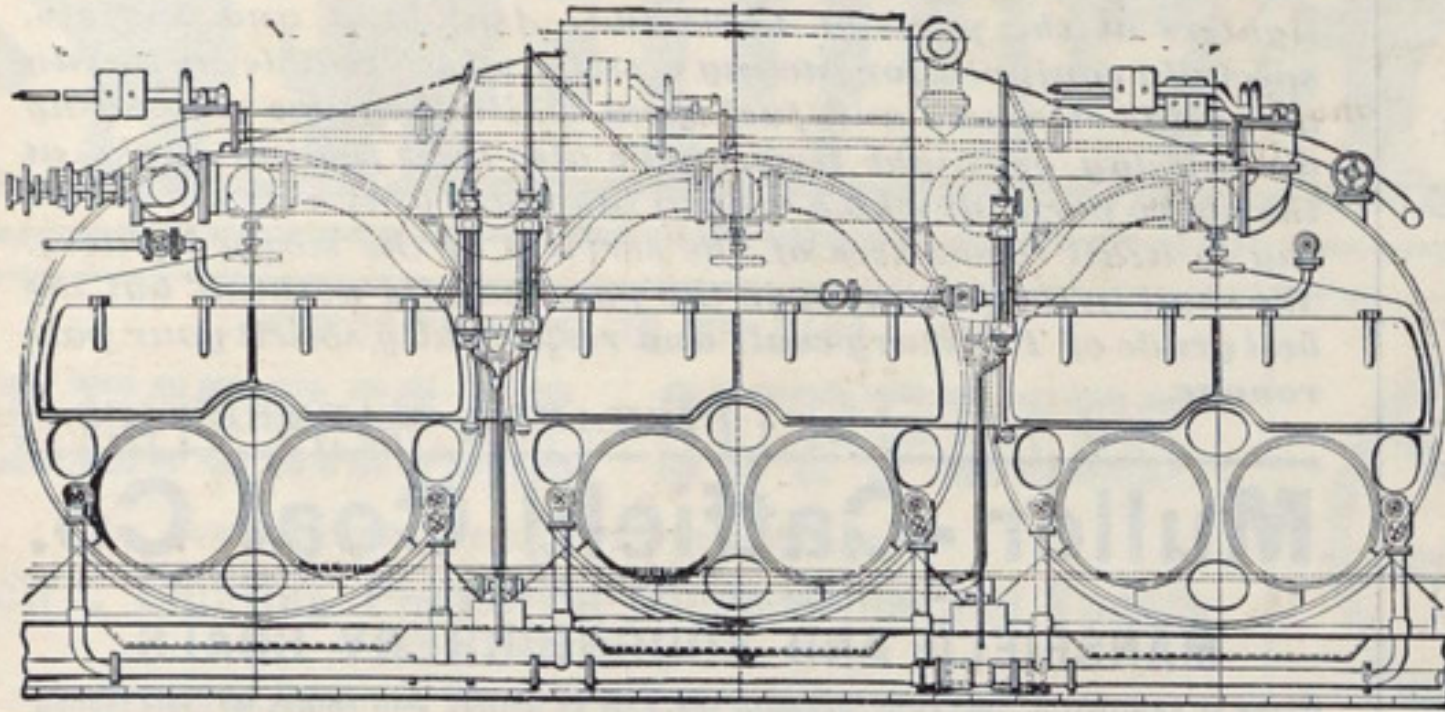
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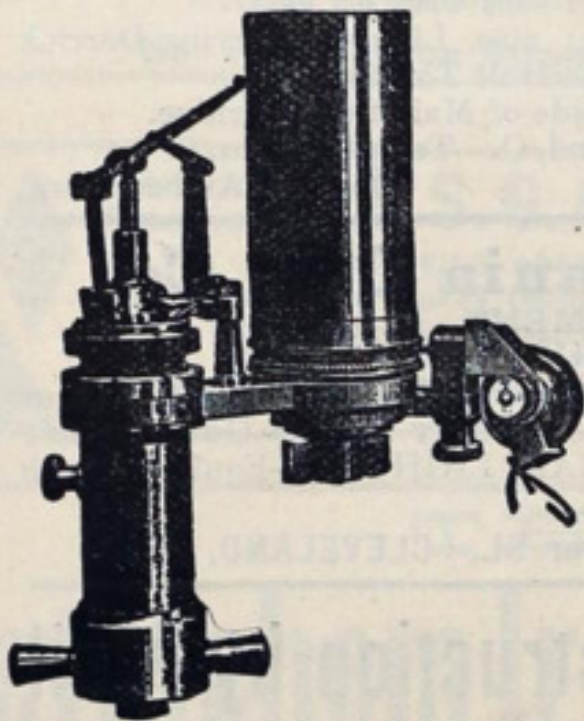
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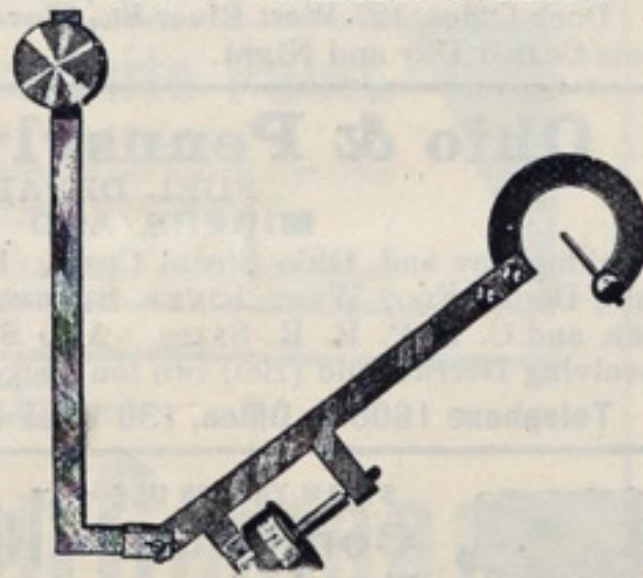
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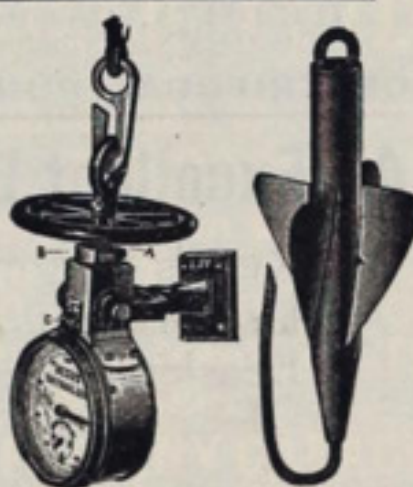
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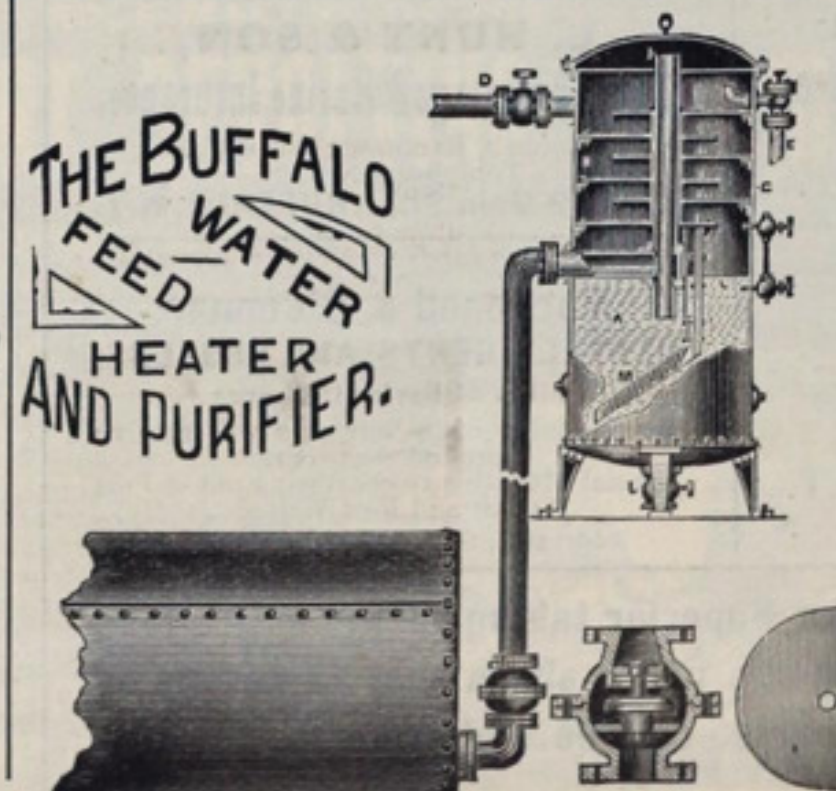
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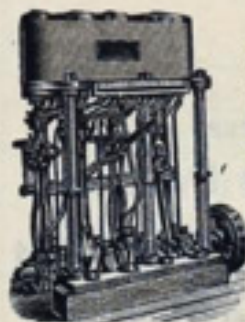
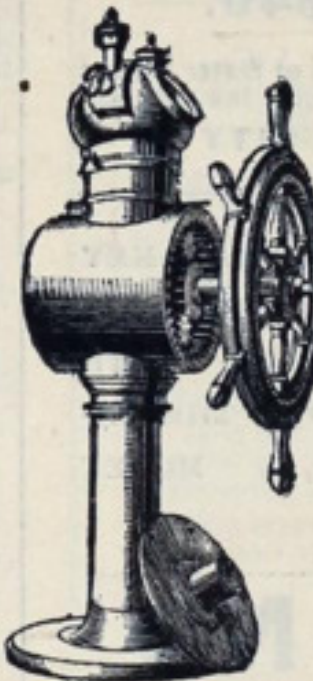
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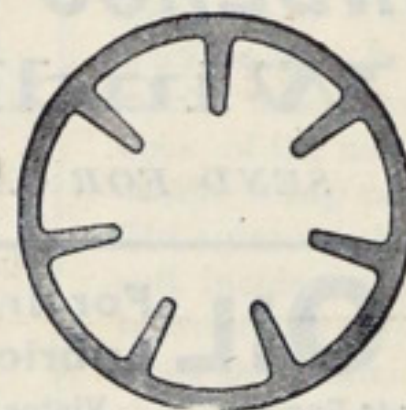
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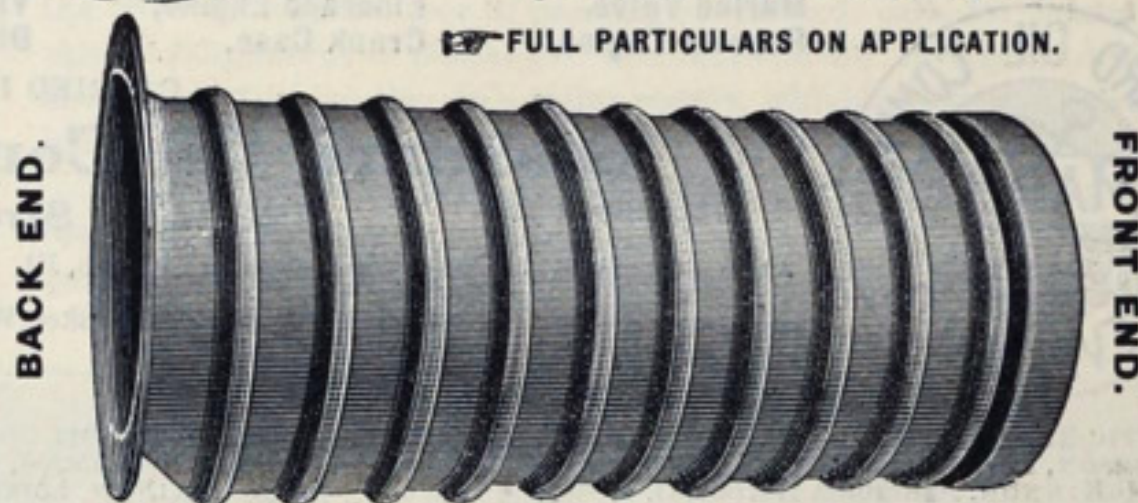
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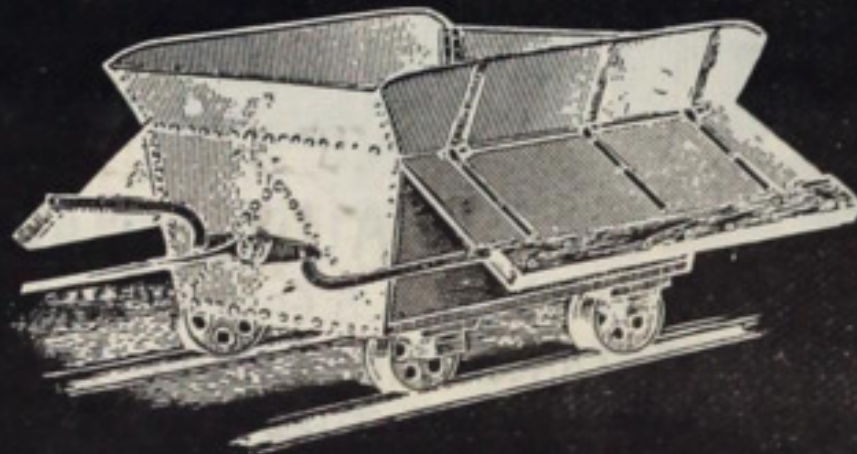
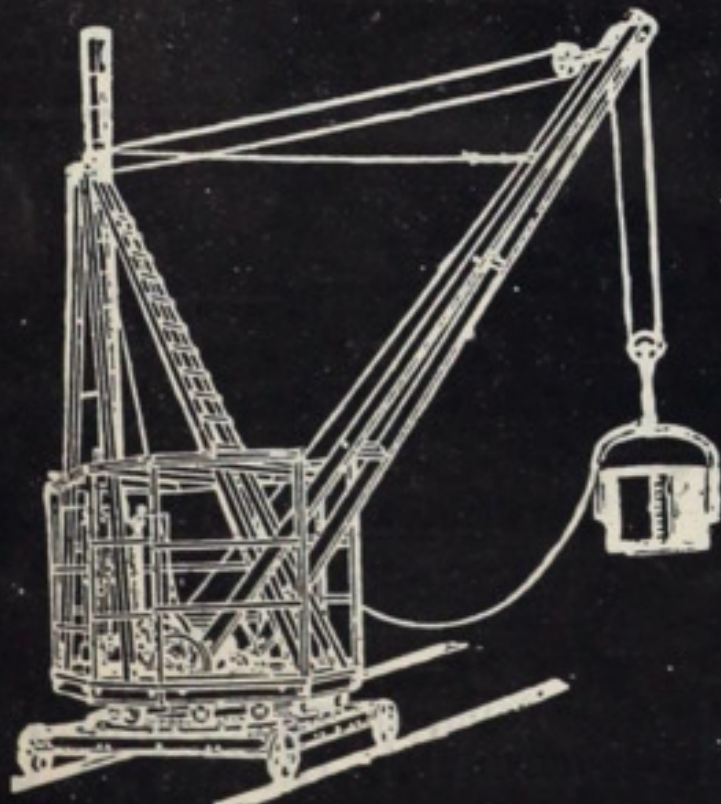
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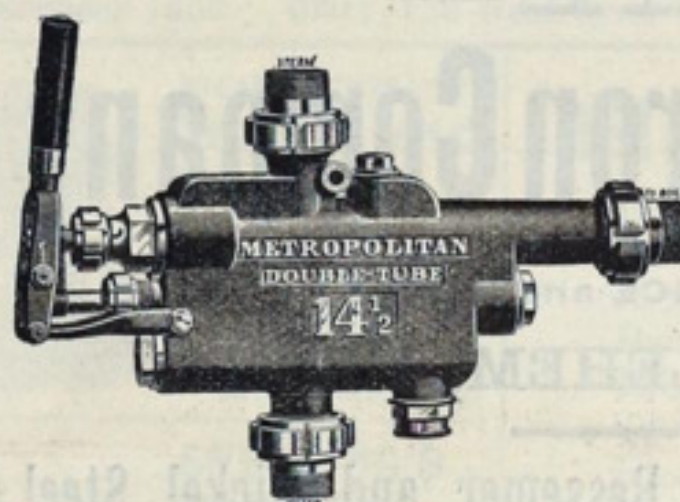
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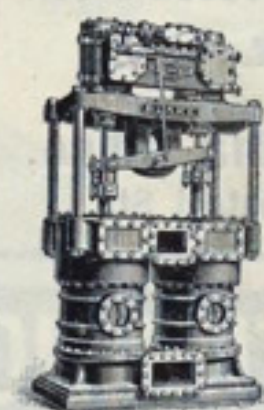
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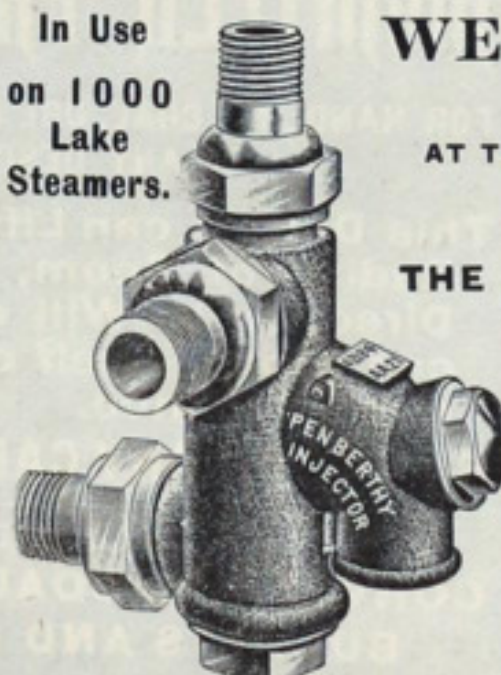
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